

Open Space Protection – Analysis and Modeling Assumptions

Introduction and Purpose

The *GO TO 2040* plan, due to be complete in 2010, will make recommendations for policies, strategies, and investments needed for northeastern Illinois to reach its potential. For the plan to be viable, it is critical that the *benefits* and *costs* of these recommendations be understood. This document is part of a series that begins to analyze potential plan recommendations in this context by developing “sample programs” for the implementation of potential plan recommendations.

In this case, a “sample program” for open space protection was developed involving the annual purchase of 5,000 acres with the *primary purpose of implementing one facet of the Chicago Wilderness Green Infrastructure Vision*. The remainder of this document, and the accompanying presentation, describe how this program was developed.

Before reviewing the remainder of this document, please read the following notes, which explain its purpose and limitations.

- **Implementation:** This document does not address the responsibility for implementing the “sample program” described here. This is a very important consideration and will be addressed as a next step.
- **Scenario context:** Open space protection will not be pursued in the absence of other strategies. CMAP recognizes that the benefits of the strategy are magnified when linked with investment in ecosystem restoration, watershed protection, and so forth. As a later step, open space protection will be analyzed along with these other strategies; but for this series of documents, CMAP is attempting to isolate and examine the benefits of individual strategies.
- **Site specificity:** The results of this analysis are not accurate at the parcel level, and further geographic detail beyond what is shown in this document cannot be given.
- **Assumptions:** To perform the analysis of the “sample program” described here, assumptions were made for appropriate locations, unit costs, and others. The purpose of this document is to allow these assumptions to be discussed and questioned, but please note that *some* assumptions must be made for any analysis to be possible.

The purpose of the analysis and modeling exercise is to determine, on a regional scale, where and how much open space acquisition would occur under the “sample program,” how much such a program would cost, how the program would affect job and household distribution, and how it would impact key indicators.

Key Assumptions

Any regional analysis and modeling process involves making assumptions. The fundamental assumptions for the open space strategy involve the following:

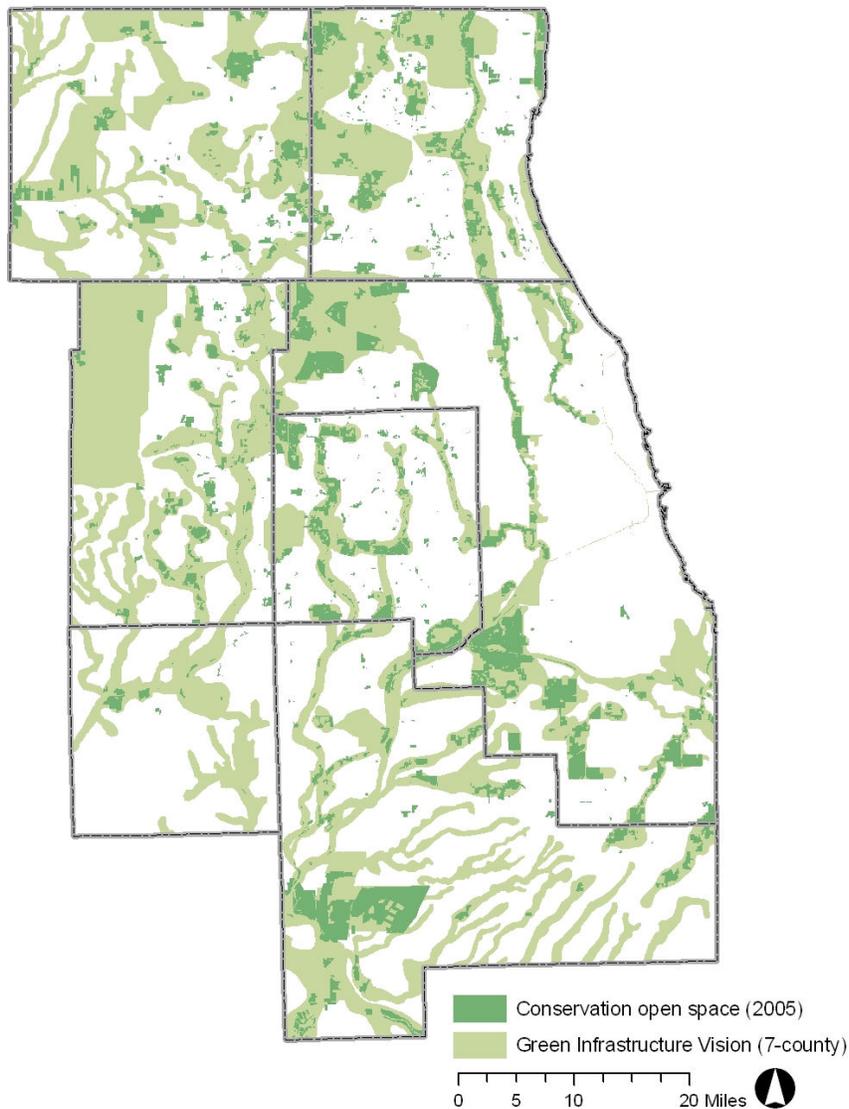
- “Open space “ is being protected primarily for region-wide conservation purposes and with the intent of implementing the Green Infrastructure Vision;
- Determining how much land to protect and where it should be located;
- Determining how much land will cost to protect; and
- Determining the impact of protecting the land.

The assumptions within each of these stages of analysis will be fleshed out in greater detail below.

1. Open space is being protected primarily for conservation purposes and to implement the Green Infrastructure Vision.

While the sample program does propose an increase in the purchase of land over recent trends (see discussion below), its main purpose is to provide a region-wide prioritization of open space acquisition for conservation purposes. Map 1 shows that land protected for conservation purposes roughly as it is today in relation to the Green Infrastructure Vision boundaries. As one element of the GIV is the acquisition of land to preserve or enhance connectivity along the corridors, the sample program stipulates that *new land acquisition in the region should take place within the GIV boundaries.*

Map 1: Existing conservation open space and the Green Infrastructure Vision

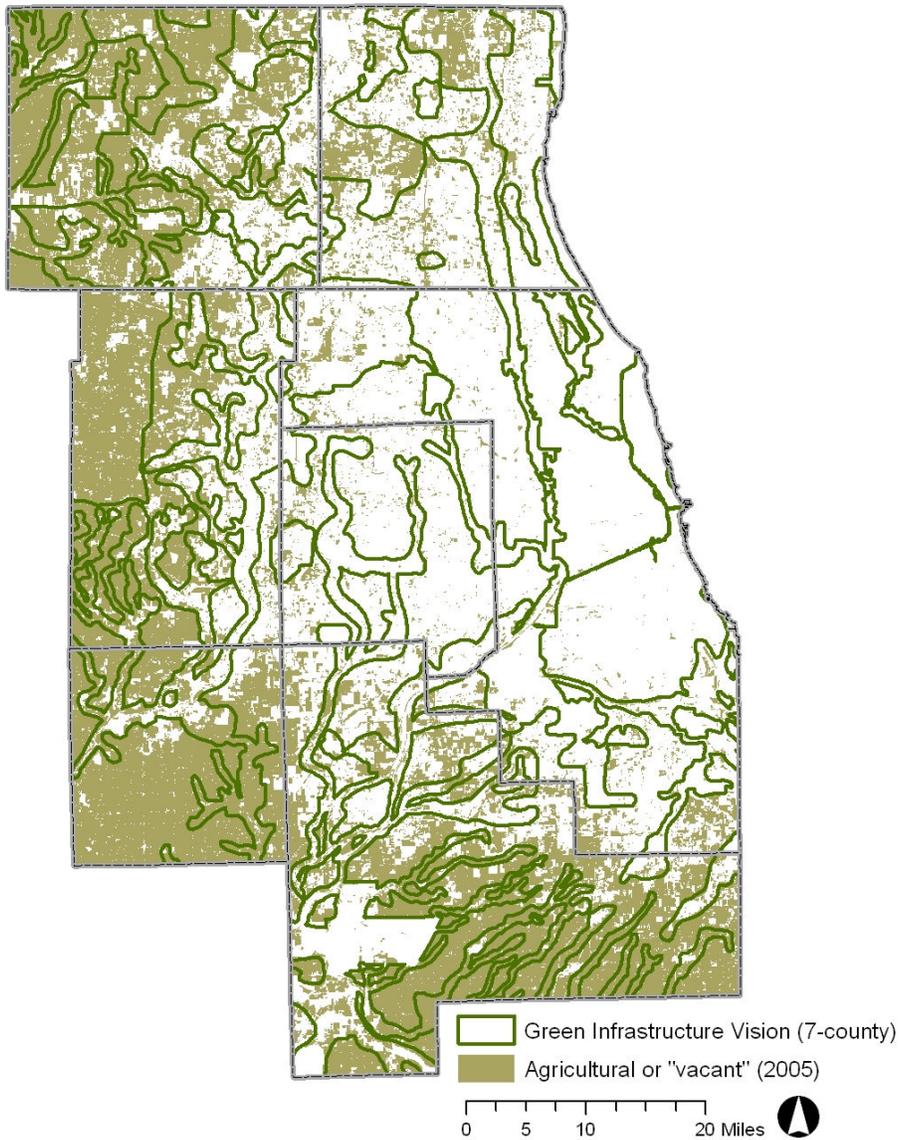


Note that neighborhood and community parks are assumed to be distinct from conservation open space in that they are mostly meant for recreation. CMAP is developing a sample program for parks separate from the open space strategy.

2. Determining how much land to protect and where it should be located.

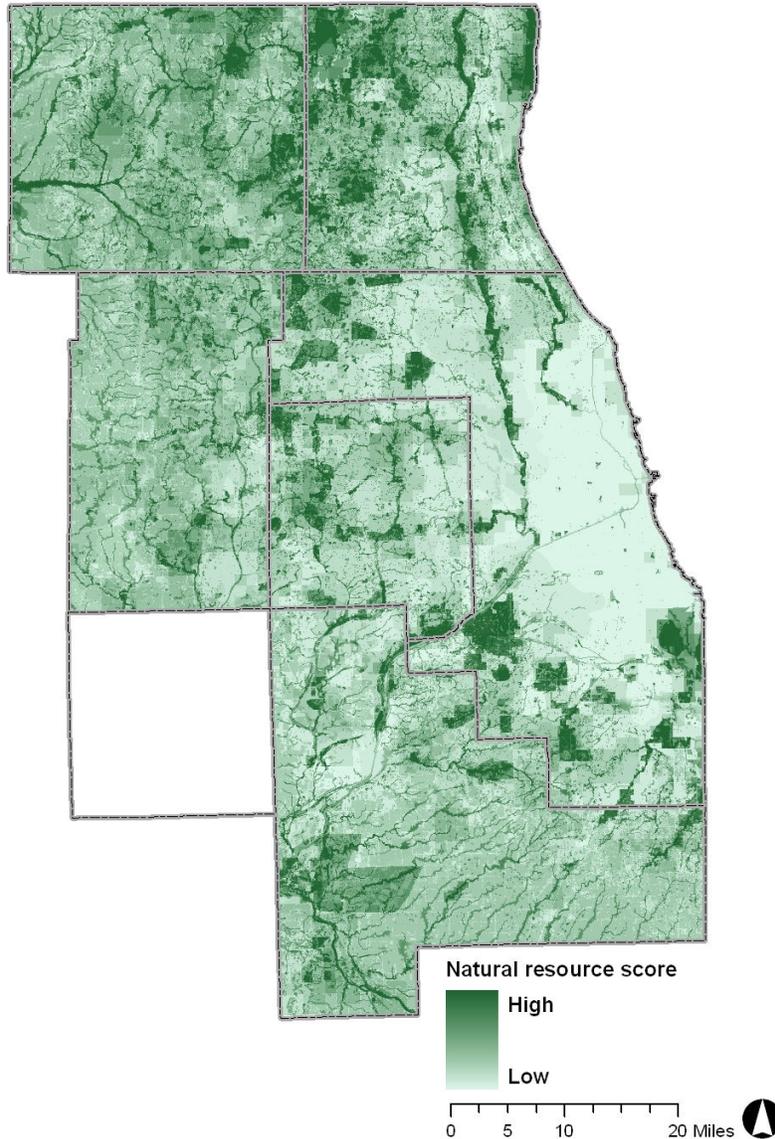
The region has been acquiring preserves at a rate of 4,400 acres per year over the past 15 years. This includes acquisitions by the county forest preserve and conservation districts and by the state. The sample program increases that rate of acquisition slightly to approximately 5,000 acres per year, or 150,000 acres by 2040. This figure is provisional, primarily because acreage targets have not yet been developed for each of the Resource Protection Areas in the GIV. When they are complete, CMAP staff intends to use the GIV acreage targets instead of the 5,000 acres/year program.

Map 2: Acquirable land in the region



“Acquirable land” in the region was defined as any land in the 2005 CMAP land use inventory that was coded as either agricultural or “vacant” forest, grassland, or wetland (Map 2). The amount of acquirable land within the GIV boundaries is much larger than 150,000 acres. Thus, a means of prioritizing land within the boundaries needs to be used. CMAP chose a method developed by Chicago Wilderness and the Northeastern Illinois Planning Commission for the *2030 Regional Transportation Plan* that assigned weights to several types of natural resources and generated an aggregate score for each 30-meter grid cell in the region,¹ as shown in Map 3. The natural resources considered and the range of typical scores for each grid cell can be found in Table 1.

Map 3: Natural resource score



¹ Described in Northeastern Illinois Planning Commission. n.d. *Natural Resource and Socio-Economic Impacts of 2030 Regional Transportation Proposals*. This document is available at <http://www.cmap.illinois.gov/GIV.aspx>.

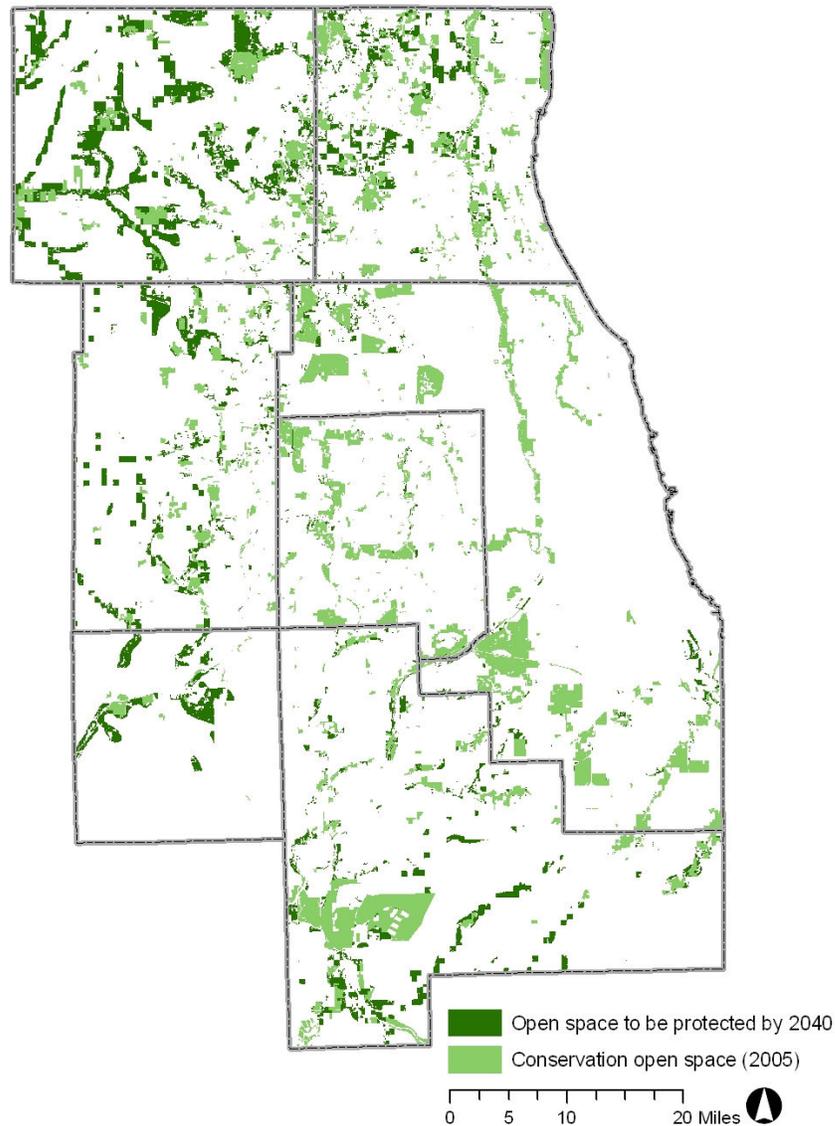
Table 1. Layers and value ranges in natural resource score

Resource Layer	Source	Buffer	Cell Score Range
Watershed sensitivity	Biodiversity Recovery Plan, Figure 6.2 categories and USGS watershed boundaries	None	1 – 4
Streams, rivers, lakes, and 100 year floodplains	US EPA's Stream Reach 3 file, waterbodies (lakes) from the USGS National Hydrography Dataset; FEMA floodplains, and IDNR's BSC ratings	60 meters (196.5 feet) or 100 year floodplain, whichever is greater	3.33 – 16.67
T&E species and communities, generalized to section	IDNR's Natural Heritage Database	None	3.33 – 16.67
Palustrine wetlands	National Wetlands Inventory	60 meters (196.5 feet)	0 or 10
Savanna, forest, woodlands, and agricultural land	IDNR GAP analysis landcover	None	0 or 10 for wooded categories, 0 or 5 for ag land
Major Sand and Gravel Aquifers	IDNR	None	0 or 2
Protected Areas: nature preserves, state parks, conservation areas, district forest preserves, federal lands, INAI sites	Chicago Wilderness - NASA landcover project	None	0 or 10

Note: While the CW/NIPC method gave additional weight to cells located in protected areas, this does not affect the results here because the sample program is identifying *unprotected* areas.

The main unit of geography CMAP uses for its analyses is the subzone, which for most of the region is essentially the same as a quartersection (160 acres). Staff overlaid the subzones and the acquirable land within the GIV boundaries, then calculated the average natural resource value of the acquirable areas. To implement the sample program, then, 150,000 acres would be acquired in descending order of natural resource value. The results of that program are shown in Map 4.

When protection priorities are defined using the GIV acreage targets, it is likely that lands to be protected will be spread somewhat more evenly across the region. On the other hand, the targets that have been submitted by forest preserve and conservation districts thus far suggest only ~100,000 acres would be recommended for protection within the GIV boundaries. Our sample program is thus somewhat more aggressive than the GIV targets.

Map 4: Sample program for open space acquisition**3. Determining how much it will cost to acquire the targeted open space.**

It was assumed that the unit cost of purchasing and managing conservation open space, given in Table 2, would be uniform across each county. It was also assumed that these costs would not rise in constant dollars, i.e., that land would not become more expensive as it becomes more scarce and that operating costs would not rise faster than inflation. These simplifying assumptions are not completely realistic, but the results do provide a lower bound estimate of the total cost of the sample program (Table 3). Restoration costs are not included in these estimates, but these costs will be calculated and added as a later step.

Table 2. Unit costs of sample open space protection program (2005\$)

County	Acquisition cost (\$/ac)	Operating cost (\$/ac)
Cook	\$46,906	\$2,123
DuPage	\$80,000	\$1,825
Kane	\$17,000	\$1,369
Lake	\$28,000	\$2,878
Kendall*	\$12,750	\$1,090
McHenry	\$13,000	\$884
Will	\$12,500	\$1,295

Source: Openlands, 2006. [Forest Preserve and Conservation Districts in Northeastern Illinois: Meeting the Challenges of the 21st Century](#)

* Kendall costs are estimated as the average of McHenry and Will

Table 3. Total costs of sample open space protection program (2005\$)

Year	Acquisition (\$)	Operation (\$/yr)	Cumulative operating cost (\$)	Acres /yr	Cumulative acres
1	127,973,266	8,999,632	8,999,632	4,997	4,997
2	122,006,113	8,201,639	17,201,270	4,995	9,992
3	98,172,346	7,764,509	24,965,779	4,925	14,917
4	105,718,803	8,214,926	33,180,705	5,070	19,987
5	104,095,709	7,655,626	40,836,331	4,898	24,885
6	91,322,667	7,197,862	48,034,193	5,110	29,994
7	113,966,956	8,153,657	56,187,850	4,947	34,941
8	99,515,453	6,872,157	63,060,008	4,971	39,913
9	99,513,818	7,541,870	70,601,877	5,008	44,921
10	98,750,809	7,340,175	77,942,053	5,005	49,926
11	89,306,522	6,768,375	84,710,428	4,927	54,853
12	96,780,036	7,419,472	92,129,900	5,096	59,949
13	84,698,899	6,339,233	98,469,133	5,046	64,996
14	78,243,493	5,897,324	104,366,457	4,934	69,930
15	103,361,834	8,444,618	112,811,075	6,371	76,301
16	59,851,341	4,417,771	117,228,846	3,641	79,941
17	85,013,671	7,068,762	124,297,608	4,986	84,927
18	91,501,397	6,722,571	131,020,179	5,048	89,974
19	38,266,337	3,406,959	134,427,138	2,185	92,159
20	114,380,493	10,263,531	144,690,669	7,771	99,930
21	87,844,830	6,918,883	151,609,552	5,053	104,984
22	90,083,991	7,513,348	159,122,900	4,894	109,877
23	92,701,304	6,756,002	165,878,902	5,058	114,935
24	100,923,967	7,332,733	173,211,635	5,047	119,982
25	85,850,987	7,106,457	180,318,092	4,997	124,979
26	73,372,035	5,908,002	186,226,094	4,963	129,941
27	82,063,569	7,092,324	193,318,418	5,029	134,970
28	39,252,903	3,462,298	196,780,717	2,107	137,077
29	116,673,255	10,895,289	207,676,006	7,822	144,899
30	82,218,388	6,964,974	214,640,980	5,092	149,991
Total	2,753,425,190		3,413,944,427		

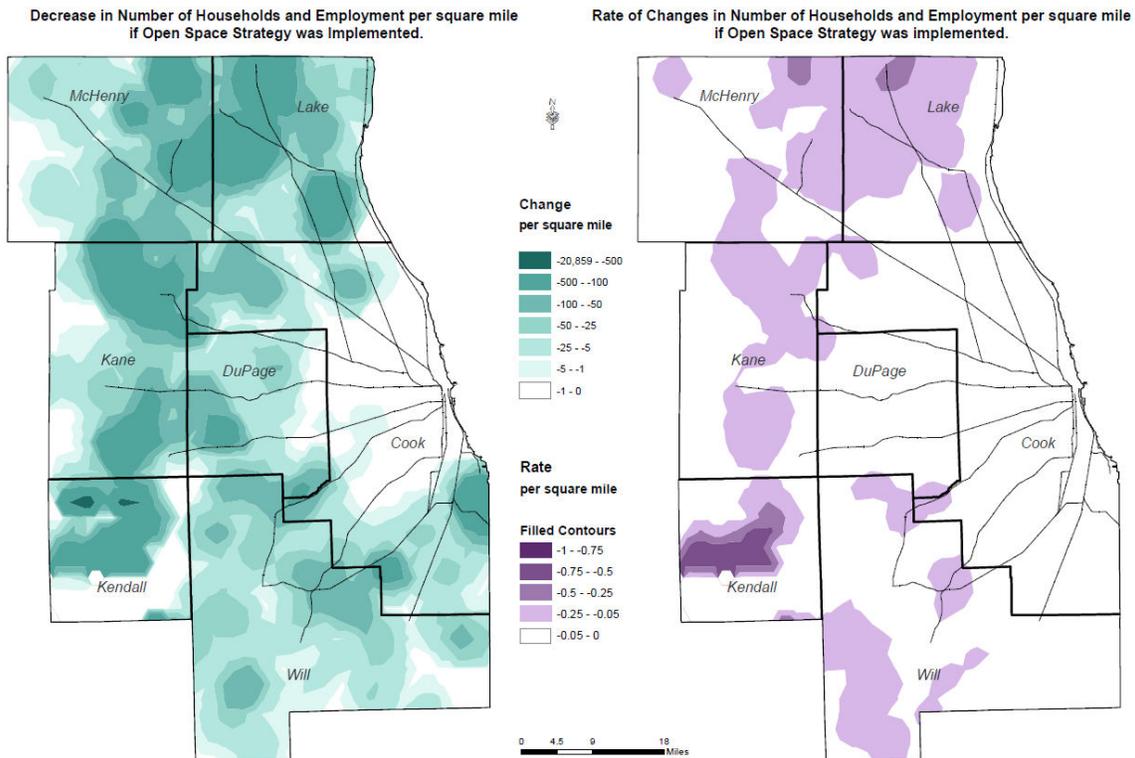
4. Determination of the impacts of acquiring open space.

Among various benefits, the following are the main impacts:

- Open space protection within the GIV will improve habitat connectivity.
- Open space protection within the GIV will decrease imperviousness and pollutant loading in sensitive watersheds.
- Open space protection will, if combined with other strategies, decrease land consumption.

Open space acquisition will also, obviously, avert the location of households and employment in the areas where it takes place. Staff estimates that the sample open space protection program would preclude approximately 250,000 households and jobs (combined) from moving to these areas. Maps 5 shows the primary impacts of this open space preservation program on the location of households and jobs within the region. It is important to realize that most of the change in households and jobs is simply redistributed, probably nearby. However, this depends on the effects of a number of policies working in combination. CMAP staff has not yet finished its analysis of these combined effects.

Map 5: Changes in households and employment per square mile with open space acquisition program



Next Steps

With the stated assumptions, the open space preservation program will preserve 150,000 acres of the region's most environmentally sensitive land at the cost of approximately \$100 million per year for acquisition and over \$200 million a year for ongoing operations and maintenance. However, this analysis is not complete, and there are several additional components which need to be considered:

- In addition to population impacts, there are other indicators to be modeled and measured, such as how the sample program impacts local budgets, transportation, and various environmental indicators. In particular, the impacts of the program on imperviousness and open space connectivity will be calculated as a next step.
- This analysis has not yet considered implementation, including who would be responsible, and whether the sample program is something that would replace or supplement current open space acquisition efforts.

These are all extremely important aspects of this strategy which need to be carefully explored and understood in the next steps of analysis.